REMARKS

In the Official Action mailed on **31 July 2007**, the Examiner reviewed claims 1-35. Claims 1-35 were rejected under 35 U.S.C. § 112. Claims 1-35 were rejected under 35 U.S.C. § 102(b) based on Cobb (WO 00/67074 hereinafter "Cobb").

Rejections under 35 U.S.C. § 112

Examiner rejected claims 1-35 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as his invention. More specifically, Examiner noted that the claims recite the term "similar," which is vague and indefinite. Furthermore, Examiner avers that the specification mentions several definitions of the term similar, which reinforces the indefiniteness of the term.

Applicant has amended claims 1, 11, 21, 31, 32, and 33 to clarify the term similar. Applicant has also cancelled claims 2, 4, 6, 12, 14, 16, 22, 24, 26, 34, and 35. No new matter has been introduced.

Rejections under 35 U.S.C. § 102(b)

Examiner rejected claims 1-35 under 35 U.S.C. § 102(b) as being clearly anticipated by Cobb. Applicant respectfully points out that Cobb is fundamentally distinct from embodiments of the present invention because the Cobb system is limited to either: (1) re-using an already-calculated solution for a layout; or (2) recalculating the entire layout. More specifically, Applicant respectfully points out that Cobb does not disclose "using the previously calculated solution for the preceding cell as an initial input to the iterative process for the target cell, wherein the iterative process **involves one or more repetitions of simulating a current**

solution for the target cell to produce a current simulated layout" (see instant application, claim 1, emphasis added).

In the system disclosed by Cobb, the system has exactly two options for determining the optical proximity corrections (OPC) for a "windowed area." These two options are clearly illustrated in FIG. 5; from element 506 (which is labeled "eq to a previously corrected windowed area"), the only two options are:

1. "reuse previously determined corrections" (element 508) or
2. "iteratively simulate to determine corrections" (element 510).

In other words, if the layout of the "windowed area" is determined to be equivalent, the Cobb system literally reuses the determined OPC for a first area on a second area (see Cobb claim 1, page 4, par. 3, lines 6-8; page 8, par. 2, lines 1-4; etc.). Otherwise, the simulator iteratively determines a completely new set of OPC (see Cobb, page 8, par. 3, lines 1-4; page 5, par. 1, lines 6-14; etc.).

In contrast, in embodiments of the present invention, the system feeds both the desired layout (i.e., the uncorrected layout) and a proposed solution for a target cell into the simulation unit (see page 10, lines 22-24 of the instant application). The proposed solution can be either the uncorrected layout or a prior solution (see page 12, lines 10-19 of the instant application). The system then **simulates at least one solution for the target cell** (see instant application, page 11, lines 5-13). During this process, the system can correct the solution to compensate for differences between the proposed solution and the desired cell layout (see page 11, lines 14-16 of the instant application). (Note that by using the proposed solution, the iterative process can be significantly shorter than can be required for a new layout.)

Embodiments of the present invention do not simply reuse a previously calculated solution for the OPC for a target cell. This allows these embodiments to correct previous simulation results in the proposed solution that were proposed

during the first simulation (see page 11, lines 21-23 of the instant application). In addition, this allows previously calculated solutions to be used for layout regions that differ from one another by less than a predetermined amount. In this case, embodiments of the present invention correct the current solution to compensate for small differences between the current simulated layout and the desired layout (see instant application, claim 1).

Applicant respectfully points out that Cobb does not disclose performing calculations of any sort on the reused OPC from the first area. The Cobb system is limited to either: (1) re-using an already-calculated solution for a layout; or (2) recalculating the entire layout.

Argument in Support of Amended Claims

On page 6 of the Office Action, Examiner avers that the combination of page 5, FIG. 1, and FIG. 5 of Cobb disclose (as in newly amended claim 1 et al.):

> if the target cell is similar to the preceding cell, using the previously calculated solution for the preceding cell as an initial input to the iterative process for the target cell, **wherein the iterative process involves one or more repetitions of simulating a current solution for the target cell to produce a current simulated layout**, wherein if the current simulated layout differs from the desired layout by less than a pre-specified amount, accepting the current solution as a final solution for the target cell, otherwise, correcting the current solution to compensate for differences between the current simulated layout and the desired layout (see instant application, claim 1, emphasis added).

Applicant respectfully disagrees. Applicant points out that the full description of Cobb's process as presented in FIG. 5 has **no error correction and/or recalculation of any kind for re-used layout areas**. In fact, with respect to step 508, Cobb teaches directly away from using previously simulated layouts for any kind of further simulation, explicitly disclosing the "reuse" of "previously determined corrections," which is further qualified in Cobb's specification as

15

"merely causing the previously determined corrections to be reused on the area" **to avoid the necessity of have to re-perform the simulations** (see Cobb, page 8, par. 2). Hence, as disclosed by Cobb, when the layout region is equivalent (carefully follow the "yes" path from decision box "is region equivalent?" in element 109), the previously determined corrections are "retrieved" from the correction database and applied **without any modifications** (see Cobb, FIG. 1 and page 8).

Applicant also points out that the so-called correction post-processor 112 within Cobb's OPC module 100 (see Cobb, FIG. 1) is deceptively named, because Cobb discloses the correction post-processor 112 only **applying corrections determined by simulator 110 to the IC mask layout without further calculations or simulations.** For example, see Cobb, page 5, par. 1:

> "simulator 110 performs, for each 'unique' area, model-based analyses to determine the appropriate corrections for the particular 'unique' area. Correction post-processor 112 makes the determined corrections for each area."

and page 8, par. 2:

> "analyzer 109 causes the previous determined corrections or mask perturbations to be retrieved from correction database 114 and applied to the IC mask layout 102 by correction post processor 112."

Hence, Applicant avers that Examiner's interpretation of Cobb as disclosing any type of re-calculation and/or correction of the previous simulation results before reusing the simulation results for an equivalent layout area has no basis.

Applicant has amended independent claims 1, 11, 21, 31, 32, and 33 to clarify that in embodiments of the present invention the iterative process involves simulating a result for an area using a previously calculated solution as an input. Applicant has also cancelled claims 8, 18, and 28. No new matter has been added.

16

Response to Examiner's Response

Examiner averred that "assuming that the iterative process ends after a single iteration then the reference anticipates the claimed invention." Applicant respectfully disagrees. Applicant respectfully points out that even in the case where the iterative process ends after a single iteration, embodiments of the present invention are not anticipated by Cobb.

Embodiments of the present invention **simulate a current solution for the target cell to produce a current simulated layout.** Hence, unlike Cobb, which discloses either: (1) using the previously calculated solution; or (2) recalculating the entire layout, embodiments of the present invention use the previously calculated solution as an initial input to a simulation calculation in order to avoid the most time-consuming first simulation step in which all edges must be considered (see instant application, page 11, lines 19-20). Because embodiments of the present invention use the previously calculated simulation as the input to the simulation calculation, subsequent simulations of similar cells merely have to **correct previous simulation results in the previously calculated solution** in order to generate the new layout, thereby avoiding the costly initial simulation steps (see instant application, page 11, lines 17-27). Nothing in Cobb discloses using the previous simulation results as an initial input to a simulation calculation.

Hence, Applicant respectfully submits that independent claims 1, 11, 21, 31, 32, and 33 as presently amended are in condition for allowance. Applicant also submits that the dependent claims that depend from claims 1, 11, and 21 are for the same reasons in condition for allowance as well as for reasons of the unique combinations recited in such claims

CONCLUSION

It is submitted that the present application is presently in form for allowance. Such action is respectfully requested.

Respectfully submitted,

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